3,108/1 Sheet

Hopkinson, 3,108 Feb. 11. 1884.

Feb. 11, 1884

"Hot Water Apparatus for Domestic and Similar Purposes"

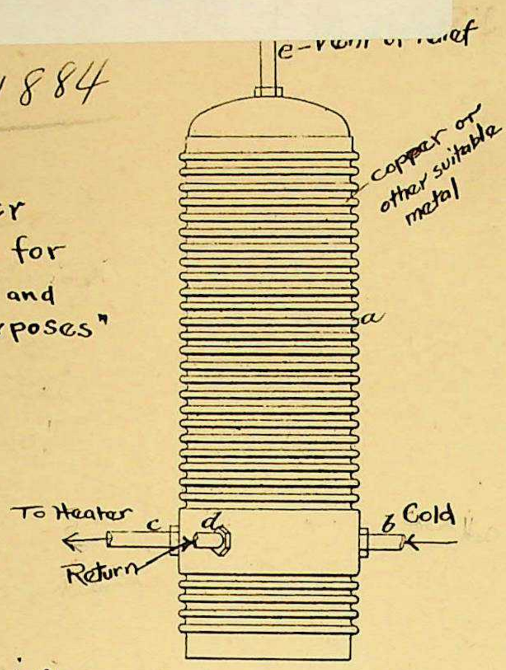


FIG. 2.

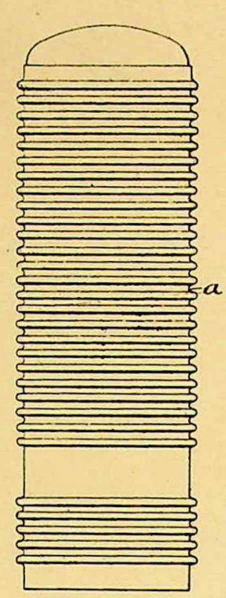
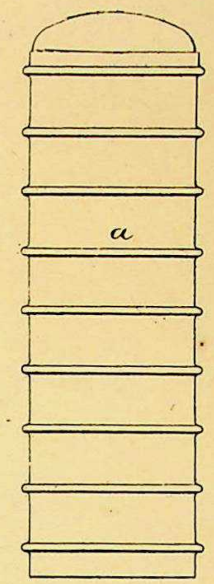


FIG. 5.



Invention is in forming the cylinders with corrugations to increase the strength and especially to prevent collapse if a partial vacuum forms in the cylinder.

FIG. 6.

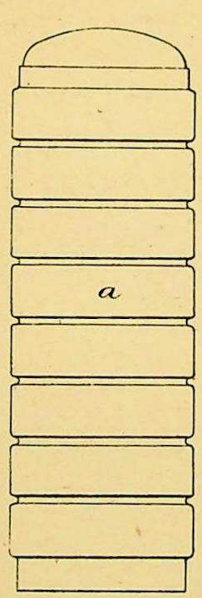


FIG. 7.

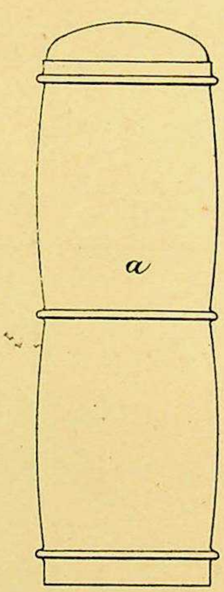


FIG. 8.

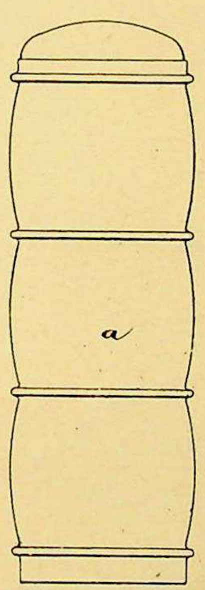


FIG. 3.

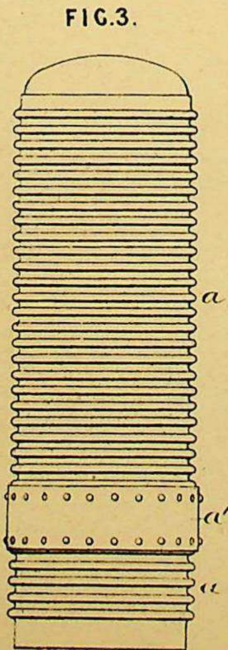


FIG. 4.

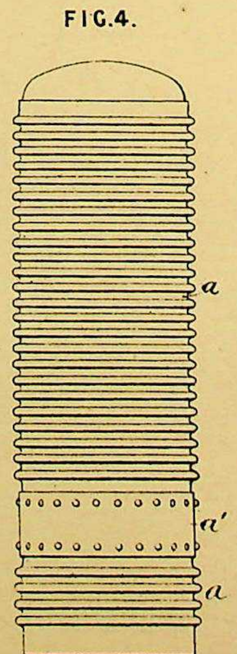
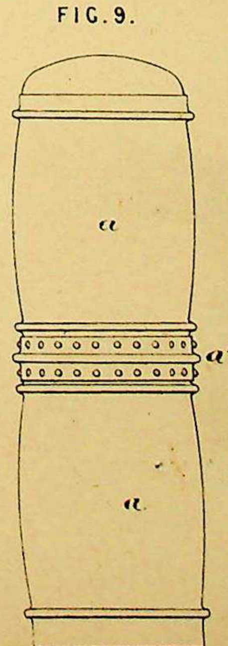


FIG. 9.



A.D. 1884, 11th FEBRUARY. N° 3108.

Improvements in Hot Water Apparatus for Domestic and similar Purposes.

COMPLETE SPECIFICATION.

We, JOHN ADDY HOPKINSON, and JOSEPH HOPKINSON, both of the firm of J. Hopkinson and C°, of Huddersfield, in the County of York, Engineers do hereby declare the nature of said invention for "IMPROVEMENTS IN HOT WATER APPARATUS FOR DOMESTIC AND SIMILAR PURPOSES" and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Our invention relates to apparatus used in dwelling houses and other buildings for supplying hot water to bath-rooms and bed-rooms and for culinary or other purposes. Such apparatus is well known and exists under various forms and arrangements. It may be generally described as consisting of a boiler (most commonly heated by the kitchen fire) a cold-water cistern at or near the top of the house and a hot-water receptacle in any convenient intermediate position; but in the most improved and modern arrangement, the hot-water receptacle is a cylinder of copper or other metal which is arranged vertically in any convenient position in the house or other building; this cylinder is connected by suitable pipes with the cold-water cistern and with the boiler so that a proper supply and circulation of the water will be maintained, and is also furnished with an air-vent or relief pipe and a pipe or pipes through which the hot water is drawn.

The adoption of this system, in which the copper cylinder is used as the hot-water receptacle, obviates much of the danger and inconvenience which attended the use of the ordinary two cistern arrangement, but these cylinders as heretofore constructed have been the cause of accidents and consequent derangement of the apparatus by reason of their liability to collapse by the external pressure of the atmosphere under conditions which not unfrequently exist. It must be borne in mind that the said cylinder is an adjunct of the cold-water cistern and is placed at a lower level than the said cistern and fed therefrom by a pipe connected to the said cistern and cylinder, in such a manner that a column or head of water is maintained above the said cylinder. And when the apparatus is working properly the said cylinder is not subject to any internal pressure beyond that due to the weight of this column of water, as the pneumatic pressure is the same externally as internally. But if through some circumstance steam pressure should accumulate in the cylinder, the internal pressure will be correspondingly increased. Precautions

[*Price* 6d.]

have been taken by the provision of well known devices to prevent accidents from this cause. But sufficient attention has not been given to the fact that if from any cause the internal pressure should be so diminished that the external pressure preponderates the cylinder will be liable to collapse at any moment.

Any circumstance which produces a vacuum or partial vacuum in the said cylinder tends to bring about the collapse of the same. The freezing of the water in the cold-water supply-pipe between the cistern and cylinder and in the air-pipe is the most obvious cause of this condition, and constant care and watchfulness will be necessary to prevent accidents therefrom.

Now our invention is designed to eliminate this element of weakness from such apparatus by constructing the hot-water cylinder or receptacle in the peculiar manner hereinafter described. To facilitate the explanation of our said invention we will refer to the accompanying drawing in which we have shewn in elevation various forms or modifications of the cylinders which we use in our hot-water apparatus.

The essential difference between the cylinders heretofore used in the above specified apparatus and our improved cylinders *a* will be at once obvious to those familiar with the manufacture or use of such apparatus, as the drawing shews clearly the manner in which we obtain the object of our invention *viz:*—by the formation of the shell of the cylinder of corrugated or otherwise curved metal in such a manner as to impart to it the necessary strength or capability of resisting external pressure. We may either form the said shell with a series of uniform corrugations or we may make the said shell partly of corrugated and partly of plain or uncorrugated portions. We prefer in all cases to have at least one plain or uncorrugated portion for convenience in connecting the necessary pipes and fittings with the said cylinder. In Figure 1, *a* is the cylinder which is formed of copper or other suitable metal and is partly corrugated and partly plain. *b* is the pipe which supplies cold water from the cistern to the said cylinder; *c* and *d* are the flow and return pipes which are connected with the boiler and maintain the circulation between the same and the cylinder *a*. *e* is the air-vent or relief pipe which communicates with the upper part of the said cylinder and with which may be connected the pipe or pipes *f* for conducting the hot water to the bath-rooms, bed-rooms or other parts of the house. The arrangement of the pipes may be varied according to circumstances. If the corrugated cylinders are made without any plain portion the pipes *b*, *c*, *d* may be fixed in the cylinder bottom.

Figures 2, 3, 4 shew other forms in which we construct the said corrugated cylinders.

In Figures 5 and 6 we have shewn the said cylinders formed partly of plain portions and partly of channel-shaped rings or hoops formed integrally with such plain portions.

In Figures 7, 8 and 9 we have shewn modifications of our invention whereby we obtain the required strength without making the shell corrugated, that is to say, we make the said shell with a portion or portions of a bulbous or longitudinally convex form and with channel-shaped rings which resemble and have the effect of the well known Bowling expansion hoops used by boiler makers.

The above described drawing illustrates the most obvious and generally convenient forms in which our invention is embodied but we may find it desirable in particular cases to adopt other forms which though not precisely similar to either of those shewn will embody the essential feature of our invention *viz:*—the resistance to external pressure by giving to the metal cylinder a shape or configuration based on curved lines. It will be obvious that by the use of our improved cylinders we obtain the necessary strength or resistance to external pressure without adding to the weight or cost of this part of the hot water apparatus.

The cylinders shewn in Figures 3 and 4 differ from those shewn in the other figures of the drawing in respect of the plain portion a^1 which is a separate hoop or ring rivetted to the portions *a*. And the cylinder shewn in figure 9 has its

upper and lower portions a made separately and united by the bowling hoop or ring a^2.

We wish it understood that we do not claim generally or irrespectively of the purpose herein specified the manufacture of corrugated metal cylinders or any particular manner of or means for producing the same.

Having now particularly described and ascertained the nature of our said Invention, and in what manner the same is to be performed we declare that what we claim is :—

The above described improvements in hot-water apparatus whereby we strengthen the portion thereof heretofore liable to accidents from the causes above specified and thereby prevent the derangement of such apparatus and the danger and inconvenience arising therefrom.

Dated this 11th day of February 1884.

HASELTINE, LAKE & Co.,
For the Applicant.

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1884.